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AUTHOR Parsons, Jacquelynne E.; And Others
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ABSTRACT

This study investigates the effects of teachers' expectancies and patterns of feedback to students on students' expectancies for success in mathematics. Six predictions involving various levels of expectancy, feedback, and sex were made. Initial statistical analysis supported the proposed relation between teachers' expectancies and student expectancies, but many of the predictions were not supported. Only student sex and teachers' expectancies were found to be significant predictor variables by a stepwise regression. Additional statistical procedures were then carried out; among the findings it was indicated that "bright" females were treated differently in each of the two classroom types. (MK)

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The Effects of Teachers' Expectancies and Attributions on Students' Expectancies for Success in Mathematics

Jacquelynne E. Parsons, Kirby A. Heller

Judith L. Meece, Carol Kaczala

University of Michigan

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Research in achievement attribution has shown that one's expectancies for success are linked to task choice and task persistence (Weiner, 1972). Applying this model to mathematics course selection, one would expect that a student's expectations of success in math would influence his/her decision to take mathematics when it becomes an option. The question addressed in this research is what effects do teachers' expectancies and patterns of feedback to students in the classroom have on students' expectancies for success in math.

Studies relating teacher expectancies to classroom behavior have shown that teachers often treat students for whom they have high expectancies differently than those for whom they have low expectancies, and that those differences are subsequently related to student's achievement (Brophy & Good, 1974). Teachers' expectancies are also conveyed by the pattern of discriminate and indiscriminate feedback given to students, which have been shown to affect students' attributions of failure (Dweck, Davidson, Nelson, & Enna, 1978). The influence of teacher' behaviors on students' expectancies has not been studied, however, despite the hypothesized importance of students' expectancies as a mediator variable in students' performance. The present research investigates teacher behaviors that might serve as the link between teachers' expectancies and students' expectancies.

Based on previous research, the following predictions were made: (a) teachers would give more positive feedback to students in the high expectancy group than to those in the low expectancy group; (b) boys, who have higher expectancies than girls, would receive more indiscriminate criticism (criticism directed toward work, the form

of the work and conduct) than girls; (c) girls would receive a higher proportion of criticism to the quality of their work and more indiscriminate praise over all than boys; (d) teachers' behaviors would influence students' expectancies for success; (e) students who received positive feedback would have higher expectancies for success than those who received negative feedback; and (f) teachers' attributions to effort would influence positively students' expectancies.

Eight seventh grade and seven ninth grade mathematics teacher were included in the sample of teachers. The sample of students included 207 boys and 194 girls of these math teachers. A modified version of two observational systems was used; namely, the Brophy and Good Teacher-child Dyadic Interaction System (Brophy & Good, 1969) and a system recently developed by Dweck (Dweck, et al, 1978). Two types of teacher behaviors were recorded: behaviors assumed to be related to teachers' expectancies and the teachers' overt, verbal attributions for students' performances. Table 1 summarizes the coding system.

Insert Table 1

Following ten observational periods, the students and teachers filled out questionnaires. Students' expectancies were assessed for success on the next math test, in math this year, and in the future. Teachers were asked to rate how well they expected each student to do in an advanced high school math course and how well each student was doing in their course that year.

Initially two types of analyses were done: a grade (2) x expectancy group (2) x sex (2) analysis of variance and a step wise regression. The Anova was performed on each of the classroom behavior

variables. The stepwise regression analysis was performed on the students' expectancies for success with classroom and background variables serving as the predictor variables.

Contrary to the prediction, teachers did not give more positive feedback to students in the high expectancy group, and boys and girls did not differ in the discriminate and indiscriminate praise and criticism of the quality of their work, the form of their work or their conduct. The only significant main effect of sex on evaluative feedback was the amount of criticism from the teacher directed toward work and toward the quality and form of work combined; girls received less work-related criticism than did boys, and less criticism to the quality plus form of their work. Surprisingly, boys and girls did not differ in the amount of criticism directed to conduct. In the stepwise regression, only the students sex and the teachers' expectancies emerged as significant predictor variables. Teacher behavior measures were not predictive of student expectancies.

In sum, then, while the proposed relation between teachers' expectancies and student expectancies was supported, the mediating effects of classroom behavior on expectancies were not demonstrated. The analyses reported thus far, however, were performed on the entire sample. It is possible that the effects of classroom behaviors are dependent on an interaction between teacher style and student characteristics. For example, some teachers may treat boys and girls differently while others do not. By collapsing across all of our teachers, these effects may have been masked. The analyses to be discussed now address this possibility.

Classroom Type Effects

In order to provide an additional test of possible mediators of sex differentiated expectancies, we selected from the sample classrooms the five classrooms with the largest sex differences in expectancies and the five classrooms with no sex differences in expectancies. The observational data were analyzed for these classrooms. Raw frequency scores were used. Most variables did not yield a significant difference. None of the variables predicted by the Dweck model yielded class-type effects. Those effects that were significant were divided into three types: behaviors characterisitc of teacher style, behaviors characteristic of student style, and behaviors dependent on both teacher and student style. These differences are summarized on Tables 2,3, and 4. High and low difference classrooms clearly differ in the dynamics we observed. Teachers in high difference classrooms, in comparison to teachers in low difference classrooms, were more critical of work, form and conduct, gave more praise for work to boys, were more likely to use a public teaching style and less likely to use dyadic interactions, and were more likely to rely on student volunteers for answers rather than directing the class participation by calling on specific children.

Insert Tables 2, 3, & 4

The effect of the child's sex on student-teacher interaction patterns was quite different in these two classroom types (see Tables 3 and 4). In particular, girls interacted more and received more praise in low difference classroom. Boys, on the other hand, interacted more and received more praise in the high difference classrooms.

We next divided the sample into two additional groups: those

students for whom the teacher had high expectancies and those students for who the teacher had low expectancies. We found that "bright" females (females for who the teachers had the highest expectancies) were treated differently in each of the two classroom types. In the classrooms with no sex differences in expectancies, relative to the classrooms with high sex differences, the bright girls interacted more, answered more questions, received more work and form praise and less criticism. In contrast, the bright boys were accorded the most praise and interacted the most in the high sex difference classrooms. These effects are summarized in Tables 5 and 6.

Insert Tables 5 & 6

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Table 1

Overview of Observational System

I. Response Opportunities: Situation in which teacher publicly questions students in the class

A. Type of Question
   1. Discipline -- teacher calls on student to redirect student's attention
   2. Direct -- teacher calls on student who has not volunteered
   3. Open -- teacher calls on student who has raised his/her hand
   4. Call-out -- student calls out the answer without permission

B. Level of Question
   1. Response -- questions that have a right or wrong answer
   2. Self-reference -- questions that ask for opinion or prediction

C. Type of Student Response
   1. Answer
   2. Don't know
   3. No response at all

D. Teacher's Feedback
   1. Praise or criticism directed to quality of the work
   2. Praise or criticism directed to the form of the work
   3. Praise or criticism directed to conduct
   4. Affirm
   5. Negate
   6. No feedback
   7. Give answer
   8. Ask other -- calls on another student to answer the question
   9. Sustaining feedback -- gives the student another opportunity to answer the question.
   10. Attributions to ability, effort and task difficulty

II. Student-Initiated Questions

A. Type of Question
   1. Content
   2. Procedural

B. Teacher's Feedback

III. Dyadic Interactions: Situations in which teacher interacts privately with student.

A. Initiator of interaction
   1. Teacher
   2. Student

B. Feedback

Table 2

Differences between Classroom Type

Behavior	Effect
Teacher Style Behaviors	
Total Praise	H > L
Total Conduct Criticism	H > L
Total Work Criticism	H > L
Total Criticism	H > L
Teacher-initiated Dyadics	H < L
Total Public Response Opportunities	H > L
Student Style Behaviors	
Student-initiated Dyadics	H < L
% of Call Outs	H < L
Joint Style Behaviors	
Open Questions	H > L
Total Dyadics	H < L
Total Answers	H > L
Total Response Opportunities	H > L

[1] H= High Difference Classroom

L= Low Difference Classroom

Table 3

Sex Differences Within Classroom Type

Behavior	Class Type	
	Low Difference	High Difference
Teacher Style Behaviors		
Total Praise	F > M	M > F
Total Work Praise	F > M	M > F
Total Conduct Criticism	F = M	M = F
Student Style Behaviors		
Total Student-Initiated Interactions	F > M	M = F
Number of Student-Initiated Content Questions	F > M	M = F
Expectancies	F = M	M > F
Joint Style Behaviors		
Total Response Opportunities	F > M	M > F
Total Dyadics	F > M	M = F
Total Number Open Questions	F > M	M > F
Total Answers	F > M	M > F
Total Interactions	F > M	M = F

[1] F= Female; M= Male

Table 4

Differences Within Sex Across Classroom Type

Behavior	Sex	
	Male	Female
Teacher Style Behaviors		
Total Praise	H > L	L = H
Total Work Praise	H > L	L > H
Total Conduct Criticism	H > L	L < H
Student Style Behaviors		
Total Student-Initiated Interactions	H > L	L > H
Number of Student-Initiated Content Questions	H = L	L > H
Expectancies	H = L	L > H
Joint Style Behaviors		
Total Response Opportunities	H > L	L = H
Total Dyadics	H = L	L > H
Total Number of Open Questions	H > L	L = H
Total Answers	H > L	L = H
Total Interactions	H > L	L > H

[1] H=High Differnece Classroom; L=Low Difference Classroom

Table 5. Sex by Classroom Type by Teacher Expectancies: General Summary

ITEM	FLL	MLL	FHL	MHL	FLH	MLH	FHH	MHH
open questions		L	H		H	LL		HH
student answers		L	H		H	LL		HH
student-initiated procedure questions	L	LL	HH	LL		L	L	L
response opportunities		L	H		H	LL		HH
praise during response opportunities	L	L	H	L		LL	LL	HH
praises for work		LL	H	L	H	L	LL	HH
praises for work and form		LL	HH	L	H	L	LL	HH
student-initiated interactions		L	H		HH	LL	L	H
total interactions		L	H		HH	LL	L	H

FLL:female, low difference classroom, teacher expectancy low
MLL:male, low difference classroom, teacher expectancy low
FHL:female, high difference classroom, teacher expectancy low
MHL:male, high difference classroom, teacher expectancy low
FLH:female, low difference classroom, teacher expectancy high
MLH:male, low difference classroom, teacher expectancy high
FHH:female, high difference classroom, teacher expectancy high
MHH:male, high difference classroom, teacher expectancy high

HH = Highest group

LL = Lowest group

Table 8. Sex by Classroom Type by Teacher Expectancies: Raw Data

ITEM	FLL	MLL	FHL	MHL	FLH	MLH	FHH	MHH	GRAND MEAN
open questions	.15*	.03	.42	.28	.48	.01	.16	.63	.27
student answers	.29	.20	.65	.46	.75	.15	.25	.98	.47
student-initiated procedure questions	.05	.02	.24	.02	.09	.04	.03	.05	.07
response opportunities	.32	.24	.75	.50	.75	.15	.29	1.1	.51
praise during response opportunities	.03	.02	.11	.02	.05	.01	.01	.12	.05
praises for work	.08	.02	.14	.05	.12	.04	.02	.17	.08
praises for work and form	.09	.03	.16	.05	.13	.04	.02	.17	.09
student-initiated interactions	1.0	.69	1.6	.88	1.9	.58	.61	1.4	1.1
total interactions	1.23	1.00	1.85	1.15	2.15	.67	.76	1.75	1.33

FLL:female, low difference classroom, teacher expectancy low
MLL:male, low difference classroom, teacher expectancy low
FHL:female, high difference classroom, teacher expectancy low
MHL:male, high difference classroom, teacher expectancy low
FLH:female, low difference classroom, teacher expectancy high
MLH:male, low difference classroom, teacher expectancy high
FHH:female, high difference classroom, teacher expectancy high
MHH:male, high difference classroom, teacher expectancy high

*mean frequencies per child per class session